



# Balancing the spatial localisation ‘Tilt’: Knowledge spillovers in processes of knowledge-intensive services



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## ABSTRACT

This paper addresses two aspects of the knowledge spillover debate that have not yet received sufficient scholarly attention: First, even though it is recognised that knowledge spillovers occur at different spatial levels (e.g. within and across companies, regions and cities, as well as at intra- and inter-industry level), spillovers are regarded as having limited spatial scope, with decaying effects at increasing spatial distance. Secondly, most knowledge spillover models measure the effects of knowledge input variables (e.g. R&D investments, mobility of labour, local labour market structure) in terms of innovation, productivity, growth or entrepreneurship and tend to pay too little attention on the exact spillover mechanism. For methodological reasons, studies on knowledge spillovers operationalise spillovers in quantitative terms and focus primarily on technological knowledge in explicit forms instead of seeking to explain market-related spillover effects from tacit knowledge and knowing in practice. Tackling these shortcomings, the paper discusses knowledge spillovers in light of recent debates in economic geography on knowledge-generating mechanisms through networks, communities of practice, and the integration of external knowledge into the innovation activities of companies. This approach allows the author to open the knowledge spillover debate that explains the spatial clustering of economic activities to a broader understanding of knowledge spillovers generated in economic processes. This perspective then identifies spillovers that unfold an impact on intra-enterprise processes, company relationships and strategic decisions.

Empirically this paper builds on a quantitative survey as well as qualitative interviews with entrepreneurs from the biotechnology and architecture/engineering sector in Brandenburg (Germany).

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## 1. Introduction

Knowledge spillovers are among the explanatory factors for the spatial concentration of economic activities, regional growth, and innovation (e.g. Marshall, 1920; Arrow, 1962; Jacobs, 1969; Romer, 1990; Caniëls, 2000; Malmberg and Maskell, 2002; Audretsch, 2003; Varga, 2004). Here, the term ‘knowledge’ refers either to technological knowledge (Glaeser et al., 1992) comprising, for instance, scientific knowledge, production possibilities and the development of new products or services, or to market knowledge (economic knowledge), which includes strategic and entrepreneurial knowledge, knowledge about available resources, preferences, rival products, product qualities and beliefs (Leppälä, 2013). Both types of knowledge exhibit two interpretations of knowledge: Knowledge as an object and knowing as a practice (Ibert, 2007; Müller and Ibert, 2014). The first interpretation, knowledge as an object, rather comprises explicit knowledge

(Polanyi, 1958) in different forms of codification, such as texts, formulas, blueprints or incorporated in artefacts such as high-tech products. These tangible knowledge forms are generally accessible (Müller and Ibert, 2014: 7) and therefore subject to spatial mobility, because they are easily transferred between different places. In contrast, the latter interpretation, knowing as a practice, refers to the collective capability to reveal knowledge in actions, activities and decisions (Ibert, 2007: 105). Here, the tacit dimension (Polanyi, 1958) is addressed that consists of experiences, expectations, beliefs and pre-existing knowledge: “[...] knowing is an active process that is mediated, situated, provisional, pragmatic and contested.” (Howells, 2012: 1004). Tacit knowledge is understood to be more sensitive to space (Howells, 2012) as it is acquired through interaction, demonstration, imitation, performance and shared experiences (Gertler, 2003: 89). Hence, the tacit dimension of knowledge, among other factors, explains the local scope of knowledge spillovers (Grossman and Helpman, 1990; Jaffe et al., 1993; Malmberg and Maskell, 2002; Simmie, 2002; Audretsch, 2003).

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At the same time, works on the spatial dimension of the knowledge economy have shown that knowledge-generating processes have become increasingly open and influenced by a diverse set of actors. Knowledge may be generated across large spatial distances, for example, through networks (e.g. Saxenian, 1996; Grabher and Maintz, 2006; Amin and Roberts, 2008a; Grabher and Ibert, 2014) and communities of practice (e.g. Wenger et al., 2002; Amin and Roberts, 2008b; Gertler, 2008; Müller and Ibert, 2014). Similarly, innovation processes are shaped by actors external to innovating companies and entrepreneurs (Slaughter, 1993; Chesbrough, 2003; von Hippel, 2005; Dahlander et al., 2008; Hafkesbrink and Schroll, 2011). Although these studies rarely address knowledge spillovers explicitly, it becomes clear that knowledge work may span across large spatial distances. However, one may question if such arrangements are used primarily for generating knowledge or innovation, or if they might also be used for benefitting from spillover effects. If so, little is known about the effects of these spillovers.

This paper argues that both streams of academic debates might benefit from each other more. Work on the spatial dimension of generating knowledge offers insights on the actual mechanisms of knowledge generation and the related spatial scope, while the spillover debate helps in being sensitive to dynamic externalities from knowledge (Glaeser et al., 1992). The paper presents empirical results from a qualitative study that surveyed companies that provide knowledge-intensive business services. Focusing on the companies' knowledge-generating processes, the study aimed at identifying how knowledge accessed in relationships is used and practiced in order to identify knowledge spillover effects. The study seeks to better identify knowledge spillover mechanisms and spillover effects. Knowledge spillover studies hardly address spillover effects in service industries. The study presented here addresses this gap by comparing two different service industries: architectural and engineering services as well as biotechnology services.

The paper contributes to the existing academic debate by identifying knowledge spillovers that influence the ability to act and to solve problems (knowledge as a practice) by examining how knowledge that spills over through relationships is actually used. Secondly, the paper adds to the empirical evidence on knowledge spillover for service industries since this economic sector is hardly recognised in spillover debates. Thirdly, the paper demonstrates

that even though tacit knowledge, in particular, is very sensitive to space, it does spill over large distances when relationships, both formal and informal, are the spillover channel.

The paper is structured as followed: the author first discusses the two major shortcomings in the spillover debate, then describes the empirical case and the methodology, before continuing on to present the empirical results. The paper concludes by discussing the empirical results in light of spillover mechanisms, their effects and spatial dimension.

## 2. The spatial dimension of knowledge spillover mechanisms

So far, the spillover debate has been directing its attention primarily on explaining the local concentration of economic and innovation-generating activities and thus on the effects of spillovers on (regional) innovativeness and growth. Doing so, most studies (quantitatively) measure input and output factors, failing to consider the spillover mechanisms that transform input to output. Here, recent works in economic geography offers complementary insights by addressing practices and processes of generating knowledge, while – vice versa – economic geography rarely addresses a distinction between intended knowledge work and knowledge spillovers.

### 2.1. Beyond local knowledge spillovers

Marshall (1920) explains the development of industrial districts with the spatial accumulation of specialised knowledge that is embedded in skilled labour, intense trade relationships between enterprises, the availability of intermediate and specialised goods and the access to trade knowledge. The spatial concentration of specialised industries further supports learning (e.g. learning by doing) and assembling specialised experiences that drive technology change (Arrow, 1962). Romer (1990) further adds that the regional stock of knowledge determines growth rates and emphasises that technological change is responsible for economic growth. Glaeser et al. (1992: 1127) therefore denominates spillover effects as theorised by Marshall (1920), Arrow (1962) and Romer (1990) as MAR-spillovers. MAR-spillovers are knowledge spillovers between companies resulting from knowledge exchange between specialised economic sectors through interaction, communication and trade relationships (see also Jaffe et al., 1993; Keilbach, 1998; Corolleur and Courlet, 2003; Combes et al., 2008). MAR-spillovers also predict that monopolies (allowing the innovators to internalise externalities) support spatial agglomeration rather than competition (Glaeser et al., 1992: 1127). In contrast, Porter (1990) underlines the importance of local competition in economically specialised regions, given that it spurs the rapid adoption, imitation and improvement of innovation (Glaeser et al., 1992: 1127).

While Porter and MAR-spillover address intra-industrial knowledge spillovers, Jacobs (1969) stresses the importance of agglomerated diversity. She explains the spatial agglomeration of economic activities with knowledge spillovers from the spatial concentration of different industries rather than similar industries. New ideas can be drawn from knowledge outside of a company's own industrial specialisation because it makes knowledge carriers think outside of boundaries established by specialised routines and practices. Inter-sectoral linkages hence support the access to and the diffusion of different knowledge, because non-competing companies and organisations are more willing to share experiences and ideas (Döring and Schnellenbach, 2006). At the same time, the spatial concentration of competition and variety "is the key to rich local knowledge transfers and the rapid adoption of innovations." (Simmie, 2002: 890).

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